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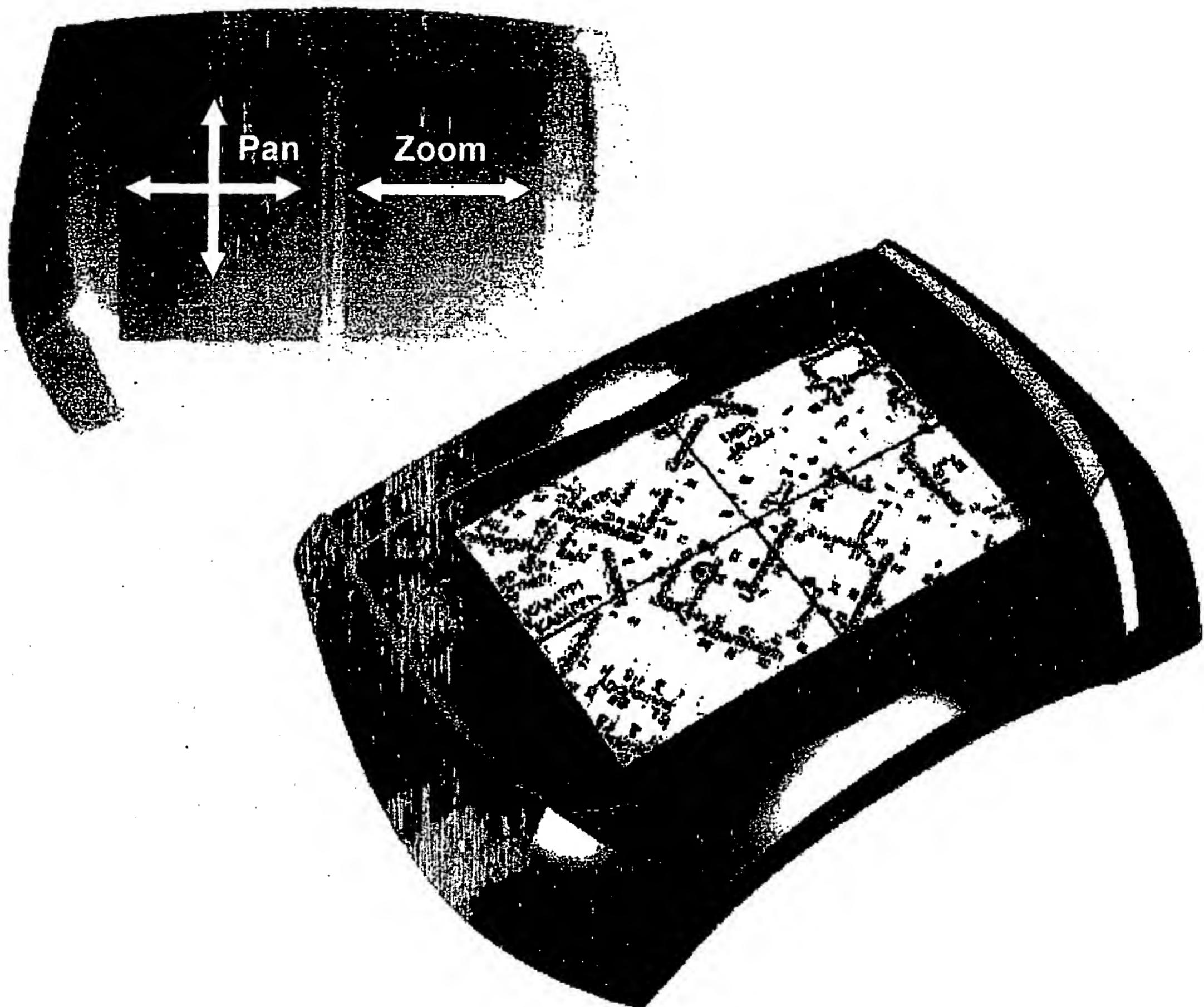
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## ZOOM-BROWSER: A DEVICE AND METHOD FOR ZOOMING AND PANNING FOR HAND-HELD DEVICES



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### 1. BACKGROUND

Large information spaces - e.g. internet pages, maps, spreadsheets etc. – are beginning to appear in hand-held devices. One of the biggest obstacles on this is the small display size. This makes the interaction cumbersome and slow, because the user needs to do lots of scrolling. Only a small portion of the large information space can be seen; therefore, the user can easily get lost.

This invention places two touchpads on the back of the two-handed hand-held device. One pad is used for smooth zooming-in and out, the other for smooth panning (i.e. moving the window content). These operations can be done simultaneously.

### 2. PRIOR ART

The problem described above is familiar from desktop-computers, although not as severe as in hand-held devices. Several solutions exist for the PC:

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- **Scrollbars:** When there is more than can be shown, the scrollbars can be used to move the window content. This is slow, however, and requires precise pointing, which interrupts the natural task flow.
- **Wheelmouse / Trackpoint-mouse:** Microsoft and IBM allow scrolling by placing a wheel or a trackpoint joystick on the mouse. This works rather OK, but is not very efficient, since the same hand is used for pointing and scrolling. Zooming is not supported. Wheelmouse also allows only vertical scrolling.
- **Zooming:** Many applications allow various levels of zoom. This takes place in steps, however, so it's "stepping" rather than real "zooming". When stepping-in, especially with a big step, the user often gets lost, because it is difficult to judge where exactly in the document the zooming took place. Stepping is typically done via a windows combobox or complex key presses (e.g. **ctrl +**, **ctrl -**), which breaks the natural task flow.
- **Pad++** is a exploratory smooth-zooming application (see <http://www.cs.umd.edu/hcil/pad++/>). However, it uses only one hand for both zooming and panning, which makes it complex and difficult to master. One hand is overloaded with complex functions, as the other hand is idle.

### 3. DESCRIPTION OF THE INVENTION

This invention places two touchpads on the back of the two-handed hand-held device (see figure on page 1). One of the pads is used for smooth zooming-in and out. When user places her finger on the zooming pad and moves it around, the image on the display zooms in and out smoothly. Either horizontal or vertical movement can be used (this can be user-defined option). User can zoom far out to see the whole information space at once, which helps in seeing the structure; or to zoom close in to see the details – or anything between these two extremes. Smooth zooming helps in keeping track of the information structure and one's own location within it.

The other pad is used for smooth panning. When user moves her finger around on the panning touchpad, the display content moves accordingly. This feels very natural, as the pad is right behind the display. The user feels like she is moving a physical object with her finger(s). Panning takes place in two dimensions, both horizontal and vertical (or any combination of these).

An important feature in this invention is that zooming and panning can be done *simultaneously*. This lets the user be in control of the zoom-operation. When zooming with one hand, the other hand can be used for corrective "steering". This is especially useful in zooming-in, where the user could easily get lost by zooming into a wrong part of the document.

Smooth zooming adds a third dimension, the depth-dimension, in the user interface. The UI content could even be truly 3D, i.e. objects could be placed in different "depths" in the information space. Alternatively, the content could be left 2D. This creates freedom for application design, for example, third party software. One application area to use 3D could be e.g. games.

### 4. ADVANTAGES OF THE INVENTION

- Suitable for hand-held devices
- Large amount of information can be shown on small display. Zooming in and out lets the user to see both "the big picture" and the details
- Efficient use of two hands
- Touchpads on the back of the device allow ergonomic use
- Smooth zooming combined with corrective "steering" allows user to keep the context, so the user does not get lost in the information space
- Adds 3D capabilities to the user interface. More freedom for the UI content design

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**5. POSSIBLE DISADVANTAGES OF THE INVENTION**

- High processing power and memory requirements
- A totally new concept, takes some time to learn

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NVO/IPR  
Leena Ranta

## NC19128 Zoom-browser: A device and method for zooming and panning for hand-held devices

Nobody can edit the description after this report is submitted for evaluation. ?

Inventors' Notes usernames ?

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One sentence crystallization of the invention ?

Two touchpads on the back of the device, zooming and panning, for efficient browsing of large information spaces on small display

One paragraph description of the invention ?

Large information spaces - e.g. Internet pages, maps, spreadsheets etc. - are beginning to appear in hand-held devices. One of the biggest obstacles on this is the small display size. This makes the interaction cumbersome and slow, because the user needs to do lots of scrolling. This invention places two touchpads on the back of the two-handed hand-held device. One pad is used for smooth zooming-in and out, the other for smooth panning (i.e. moving the window content). These operations can be done simultaneously.

In my opinion the invention belongs to category (not necessary to fill in) ?

A

Place or method of publication: ?

According to the research subcontract, the research partner (York University) is allowed to publish this invention in 2002

Signature of inventor(s) ?

Date:

Signature:

**Miika Silfverberg**

Related project ?  
**AHMI**

Publication date (e.g. 15-Jan-2001) ?  
**1-Jan-2002**

I/we consider the invention to belong to the category indicated above and to my/our best knowledge, I am / we are the sole and original inventor(s) of this invention. The company may, by virtue of the valid legislation, be entitled to full or partial rights to the invention. I/we acknowledge my/our obligation to sign as inventor(s) all documents that may be required for protecting the invention in different countries.

Other technical information or attachments: ?

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